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(54) Skate with in-line wheels

(57) A skate with in-line wheels, including a U-shaped frame which forms a base, above which a shoe is associated, and two lateral wings protruding towards the ground; a separate truck for supporting the wheels is slidingly associated with the frame in contrast with at least one flexible and interchangeable element. This solution allows independent shock-absorbing of each wheel and the quick and easy customization of the shock-absorbing properties of each wheel by the user.

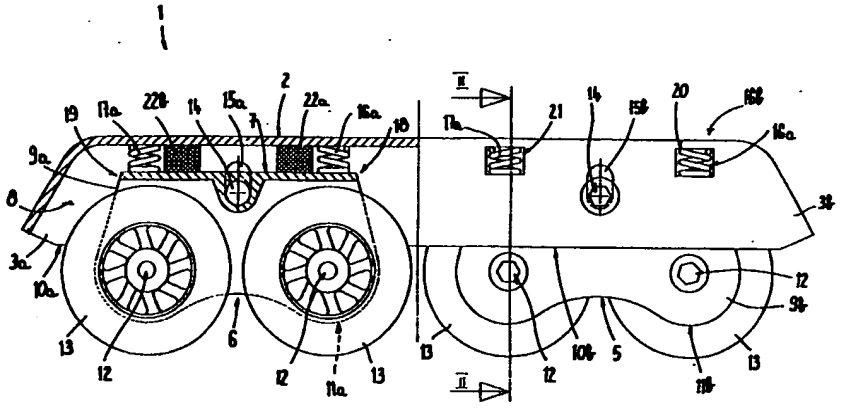


FIG.1

EP 0 848 971 A1

Description

The present invention relates to a skate with in-line wheels.

Conventional skates with in-line wheels generally comprise a frame, supporting a plurality of in-line wheels and which is substantially U-shaped so as to form at least one supporting base for all or part of the sole of a rigid or semirigid shoe.

Two lateral wings protrude downwards from the base of the frame,and a plurality of wheels are pivoted thereto by means of fixed pivots between said wings and are thus arranged in-line with respect to each other.

These conventional skates entail a drawback: during skating all the vibrations and forces caused by the impacts affecting the wheels on rough ground or stones, or on any other object on the ground, are transmitted to the foot and therefore to the entire bone structure of the user.

DE-451,163 discloses a partial solution to this drawback; a roller skate has two wheels articulated by means of levers constituted by pairs of brackets which surround the wheels. The brackets are articulated, through their open ends, to a flat plate constituting the frame of the skate. At the same time, each bracket has a plurality of fixing points for selecting and setting the preloading of the springs, so as to match the different forces applied by the user, and of the stroke limits for limiting the deflections of the spring-loaded levers.

However, this solution is not very practical because it does not allow the optimum transmission of forces from the foot to the skate and therefore entails considerable problems in use.

US-920,848 illustrates a skate with in-line wheels and having a supporting plate for a shoe which can be locked thereat by means of adapted tensioning straps. Lateral bars protrude from the plate and are connected by a first strap for supporting the rear part of the user's leg and by a second strap which surrounds the calf and can be secured thereto.

Two arms are pivoted below the plate at one end and have supports for a wheel, said arms interacting, at the other end, with a spring interposed between said arms and the plate that constitutes the frame.

Even this arrangement, however, entails the same drawbacks mentioned above as regards skate control, because the structure use shock-absorbers for the wheels which are not ideal, since there is in any case an articulation point rigidly connected to the plate that constitutes the frame.

EP-545,250 relates to a braking device for skates with in-line wheels wherein a supporting frame for a shoe is provided, in a downward region and centrally, with a tab whereto the ends of two pairs of bars are pivoted. Wheels are pivoted to the bars and a flexible element is interposed in the interspace between two adjacent wheels of each pair of bars, said element being connected below the overlying frame at its other end.

This arrangement only partially solves the described problems, because the pairs of bars are still rigidly coupled, at one of their ends, to an articulation point rigidly connected to the shoe supporting frame.

WO96/26775 discloses a skate with in-line wheels provided with a frame whereto two curved trucks are pivoted at the regions below the toe and the heel. The wheels are pivoted to the ends of the trucks and the trucks can thus oscillate with respect to the frame and can be provided with spring-loaded or rubber-pad shock-absorbers, for shock-absorbing the truck particularly when, by oscillating about the frame pivot, it abuts against said frame with one end.

However, also this arrangement does not solve the above-mentioned problems, because in any case each truck is pivoted at an articulation point rigidly connected to the frame, whereto it therefore transmits part of the vibrations or stresses affecting the wheels.

An aim of the present invention is therefore to overcome the above-described drawbacks and to solve the above problems by providing a skate with in-line wheels comprising a substantially U-shaped frame supporting, in an upward region, a rigid or semirigid shoe and allowing to achieve optimum shock-absorbing of the wheels, thus allowing to optimally cushion the vibrations and/or stresses affecting the wheels.

An important object of the present invention is also to provide a skate with in-line wheels wherein the user can select the degree of shock-absorbing according to individual specific requirements or according to the course to be followed.

A further object of the present invention is to provide a skate with in-line wheels which at the same time allows to achieve optimum transmission of forces from the shoe to the wheels.

A further object of the present invention is to provide a skate with in-line wheels wherein it is possible to selectively vary the position of the rotation axis of at least one wheel.

A further object is to provide a skate with in-line wheels having a simple constructive structure and which is easy to industrialize.

A further object is to provide a skate with in-line wheels wherein the user can immediately perceive the intended and selected degree of shock-absorbing applied to the wheels.

This aim, these objects, and others which will become apparent hereinafter are achieved by a skate with in-line wheels, comprising a substantially U-shaped frame which forms at least one base, above which a shoe is associated, and two lateral wings protruding downwards the ground, characterized in that at least one separate truck for supporting at least one wheel is slidingly associated with said frame in contrast with at least one flexible and interchangeable element.

It is noted that it is advantageously possible to selectively interpose, between the base of the frame

and the truck, a means adapted to vary the position of the wheel rotation axis.

Further characteristics and advantages of the present invention will become apparent from the following detailed description, and the accompanying drawings, wherein particular embodiments thereof are illustrated by way of non-limitative example and wherein:

Fig. 1 is a partially sectional side view of the frame, with two separate supporting trucks applied thereto, each truck supporting two wheels;

Fig. 2 is a sectional view, taken at the plane II-II of Fig. 1;

Fig. 3 is a view, similar to Fig. 1, of a second embodiment of the present invention;

Fig. 4 is a view, similar to Fig. 3, of a third embodiment of the present invention;

Fig. 5 is a side view of a fourth embodiment of the present invention;

Fig. 6 is a sectional view, taken at the plane VI-VI of Fig. 5.

With reference to the figures, the reference numeral 1 designates a frame of a skate with in-line wheels, said frame being substantially U-shaped in transverse cross-section, so as to form at least a first base 2 for supporting a shoe and two first lateral wings, designated by the reference numerals 3a and 3b, which are parallel to each other and directed towards the ground 4.

A first truck 5 and a second truck 6 are slidingly associated with the frame 1. Each truck is U-shaped and comprises a second base 7 which is approximately as wide as the interspace between the inner lateral surfaces 8 of the fast lateral wings 3a and 3b. Two second side wings 9a, 9b protrude from the second base 7 and are parallel to each other.

The first truck 5 and the second truck 6 can therefore be inserted at the frame 1 and the second lateral wings 9a and 9b can slide with respect to the first lateral wings 3a and 3b.

The second lateral wings 9a and 9b protrude beyond the lower perimetric edge 10a and 10b of the first lateral wings 3a and 3b, and a pair of first pivots 12 for pivoting wheels 13 is transversely associated along parallel axes proximate to the free ends 11a, 11b of the second lateral wings 9a and 9b.

The wheels have of course such dimensions that they can be contained in the interspace between the second lateral wings 9a and 9b without interacting with the second base 7 of each truck.

Each one of said first and second trucks has a means for guiding it during its sliding inside the frame 1, said means being constituted by a second pivot 14 transversely pivoted to each second base 7 in the interspace between the two adjacent wheels 13, the ends or said second pivot being accommodated in, and interacting with, a pair of adapted first seats 15a and 15b formed at the first lateral wings 3a and 3b of the frame 1 along an axis approximately perpendicular to the ground 4.

The first and second trucks slide with respect to the frame 1 in contrast with first and second flexible elements interposed between the second base 7 and the first base 2.

The first flexible elements are constituted, for each truck, by a first pair 16a, 16b and by a second pair 17a, 17b of cylindrical helical compression springs arranged transversely to the second base 7, respectively proximate to the front and rear ends 18 and 19 of each second base 7.

Said first and second pairs of springs are interchangeable and are accommodated at adapted pairs of second seats 20 and third seats 21 formed at the first lateral wings 3a and 3b.

Said first and second pairs of springs are also advantageously used to cushion part of the load and therefore interact both with part of the second base of the first and second trucks and optionally with part of the first lateral wings 3a and 3b, as shown in figure 2.

The second flexible elements interposed between the second base of each truck and the first base of the frame are constituted by a third pair of Belleville spring washers or rubber pads, designated by the reference numerals 22a and 22b, which are arranged at the longitudinal median axis of the second base 7, in the interspace between the second pivot 14 and the front and rear ends 18 and 19.

Advantageously, said third pair of Belleville spring washers or rubber pads is meant to cushion the remaining part of the load.

Both the first flexible elements and the second flexible elements may of course be replaced with others having a different load or a different compressive strength.

It is thus evident that the illustrated solution allows to fully solve the above-stated aim and objects, since it is possible to achieve independent shock-absorbing of each wheel and to provide independent customization for each wheel, the user being able to preselect the first and/or second flexible elements which have the intended flexibility characteristics according to the user's own build or to the sport to be practiced or to the particular configuration or nature of the ground.

The present invention is of course susceptible of numerous modifications and variations, all of which are within the scope of the present inventive concept.

Thus, for example, Fig. 3 illustrates a frame 101 wherein the first pair of springs 116 and the second pair of springs 117 are again interposed between the second base 107 of each first and second truck 105 and

106 and the first base 102 of the frame 101; the axis of said first and second pairs of springs, however, is inclined with respect to said first and second bases.

Accordingly, the first seats 115a and 115b formed on the first lateral wings 103a and 103b are inclined along the same axis.

Advantageously, the first and second pairs of springs are interposed between first raised portions 123 and second raised portions 124 which protrude, respectively from said first base 102 and from said second base 107, along planes inclined at right angles with respect to the plane of arrangement of the ends of each one of said first and second pairs of springs.

The inclination of the first and of the second pairs of springs and of the first seats allows, in case of collision of the wheels with stones or other objects protruding from the ground, to cushion the main component of the impact force. If the skater performs lateral thrusting in order to increase his or her speed, the inclination allows to transmit a large extent of force to the wheels, wasting a limited amount of energy.

Fig. 4 illustrates another embodiment for a frame 201, wherein each individual wheel 213 is pivoted transversely at the second lateral wings 209a, 209b of a single truck, generally designated by the reference numeral 205, which is slidingly associated between the first lateral wings 203a and 203b of the frame 201 along an axis which is perpendicular or, as shown in figure 4, at an angle with respect to the first base 202 of the frame 201.

Each wheel 213 is pivoted at a second pivot 214 the ends whereof are located at adapted first seats 215a, 215b arranged at an equal angle with respect to the truck 205.

Advantageously, each truck 205 slides not only between said first wings 203a, 203b but also between a pair of adapted tabs 225a, 225b protruding below the first base 202 towards the ground along an axis which is parallel to the plane of arrangement of the truck, the pair of tabs being arranged transversely to the first lateral wings 203a, 203b, and the front end 218 and rear end 219 of each truck interacting with said pair of tabs.

The dimensions of the pair of tabs are of course such as to allow normal rolling of the wheels.

In this case, too, first flexible elements are interposed between the second base 207 of each truck and the overlying first base 202 of the frame and are constituted by a single spring 216 interposed between said second base and first raised portions 223 protruding from the first base 202.

This embodiment, too, therefore solves all of the intended aim and objects, the customization of the obtainable degree of cushioning for each individual wheel being even greater.

Figs. 5 and 6 illustrate a further embodiment of the present invention for a skate 326 comprising a shoe 327 the sole 328 whereof is associated, preferably at two regions, on the first base 302 of the frame 301, said frame also comprising a pair of first lateral wings 303a and 303b which protrude towards the ground 304.

This embodiment, too, comprises a first truck 305 and a second truck 306 which are identical to each other, are slidingly associated with the frame 301, and have second lateral wings 309a, 309b which can slide within the first lateral wings 303a, 303b.

In this case, too, the wheels 313 are pivoted transversely, by means of first pivots 312, proximate to the free end 311a and 311b of the second lateral wings 309a and 309b.

A flap 329a and 329b protrudes from both of the second lateral wings 309a and 309b above the pivoting axis of the first pivots 312; said flaps arrange themselves approximately parallel to the overlying lower perimetric edge 310 of the first wings 303a, 303b.

Adapted second seats 320 for first flexible means, constituted by first pairs of springs 316a, 316b and by a second pair of springs 317, are formed at the lower perimetric edge 310a, 310b of the first wings 303a, 303b which are adjacent to the flaps 329a, 329b, proximate to the front end 318 and rear end 319 of the first truck 305 and of the second truck 306.

The first truck 305 and the second truck 306 again have a second pivot 314 transversely connecting the second wings 309a, 309b; said ends are accommodated at first seats 315 which are substantially slotted with an axis which is approximately perpendicular to the ground 304.

A second flexible element can be interposed in the interspace between the second base 307 and the first base 302 and is constituted by a third pair of springs or pads 322a, 322b which can be removed and have, in a longitudinal sectional view, substantially an isosceles-trapezoid configuration allowing to vary the rotation axis of one or more wheels in an upward direction or in a downward direction.

The second pair of springs or pads can of course be accommodated at the interspace between the first and the second bases by providing an opening 341 at one of said second lateral wings, as shown in figure 6.

The pads 322a, 322b can be replaced either by removing them through the opening 341 or after extracting the second pivot 314 and then removing the truck from the frame.

These embodiments, too, achieve the stated aim and objects. The skate, according to the invention is susceptible of numerous modifications and variations, within the scope of the appended claims. The materials and the dimensions constituting the various individual components of the skate may also vary according to particular requirements.

Claims

1. A skate with in-line wheels, comprising a substantially U-shaped frame forming at least one base, above which a shoe is associated, and two lateral

wings protruding towards the ground, characterized in that at least one separate truck for supporting at least one wheel is slidingly associated with said frame in contrast with at least one flexible and interchangeable element.

2. A skate according to claim 1, characterized in that it comprises a means interposed between said at least one base of the frame and said at least one truck, said means being adapted to vary the position of the rotation axis of said at least one wheel.

3. A skate according to claim 2, characterized in that it further comprises a second truck slidingly associated with said frame, said first and second trucks being U-shaped.

4. A skate according to claim 3, characterized in that said first and said second trucks have a second base which is approximately as wide as the interspace between the inner lateral surfaces of said first wings, a pair of second parallel lateral wings protruding from said second base.

5. A skate according to claim 4, characterized in that said second lateral wings, which can slide with respect to the first lateral wings, protrude beyond the lower perimetric edge of the first lateral wings, a pair of first pivots for wheels being transversely associated, along parallel axes, proximate to the free ends of the second lateral wings.

6. A skate according to claim 5, characterized in that each one of said first and second trucks has means for guiding their sliding inside said frame, said means being constituted by a second pivot transversely pivoted to said second base in the interspace between two adjacent wheels, the ends of the second pivot being accommodated and guided at a pair of adapted first seats formed at the first lateral wings of the frame along an axis which is approximately perpendicular to the ground plane.

7. A skate according to claim 6, characterized in that the sliding of said first and second trucks with respect to said frame occurs in contrast with first and/or second flexible elements interposed between said second and first bases.

8. A skate according to claim 7, characterized in that said first flexible elements are constituted by a first and by a second pairs of cylindrical helical compression springs arranged transversely to said second base respectively proximate to the front and rear ends of each second base.

9. A skate according to claim 8, characterized in that said first and second pairs of springs are interchangeable and are accommodated at adapted pairs of second and third seats formed at said first lateral wings.

10. A skate according to claim 9, characterized in that said first and second pairs of springs interact both with part of said second base of the first or second truck and with part of said first lateral wings.

11. A skate according to claim 7, characterized in that said second flexible elements interposed between said second and first bases are constituted by a third pair of Belleville spring washers or rubber pads arranged approximately at the longitudinal median axis of the second base, in the interspace between the second pivot and the front and rear ends.

12. A skate according to claim 8, characterized in that the axis of said first and second pairs of springs is perpendicular to the first and second bases.

13. A skate according to one or more of the preceding claims, characterized in that the axis of said first and second pairs of springs is inclined with respect to the plane of arrangement of the first and second bases.

14. A skate according to claim 13, characterized in that said first seats formed on the first lateral wings are inclined along the same axis as the first and second pairs of springs.

15. A skate according to claim 14, characterized in that said first and second pairs of springs are interposed between first and second raised portions protruding respectively from said first and second bases along planes which are inclined at right angles to the plane of arrangement of the ends of each first and second pairs of springs.

16. A skate according to one or more of the preceding claims, characterized in that each individual wheel is transversely pivoted at second lateral wings of said truck slidingly associated between said first lateral wings of said frame along an axis which is perpendicular or inclined with respect to said first base of said frame.

17. A skate according to claim 16, characterized in that each wheel is pivoted at a second pivot the ends whereof are arranged at adapted first seats which are arranged at the same angle with respect to said truck.

18. A skate according to claim 17, characterized in that each one of said individual trucks slides between said first wings and between a pair of adapted tabs

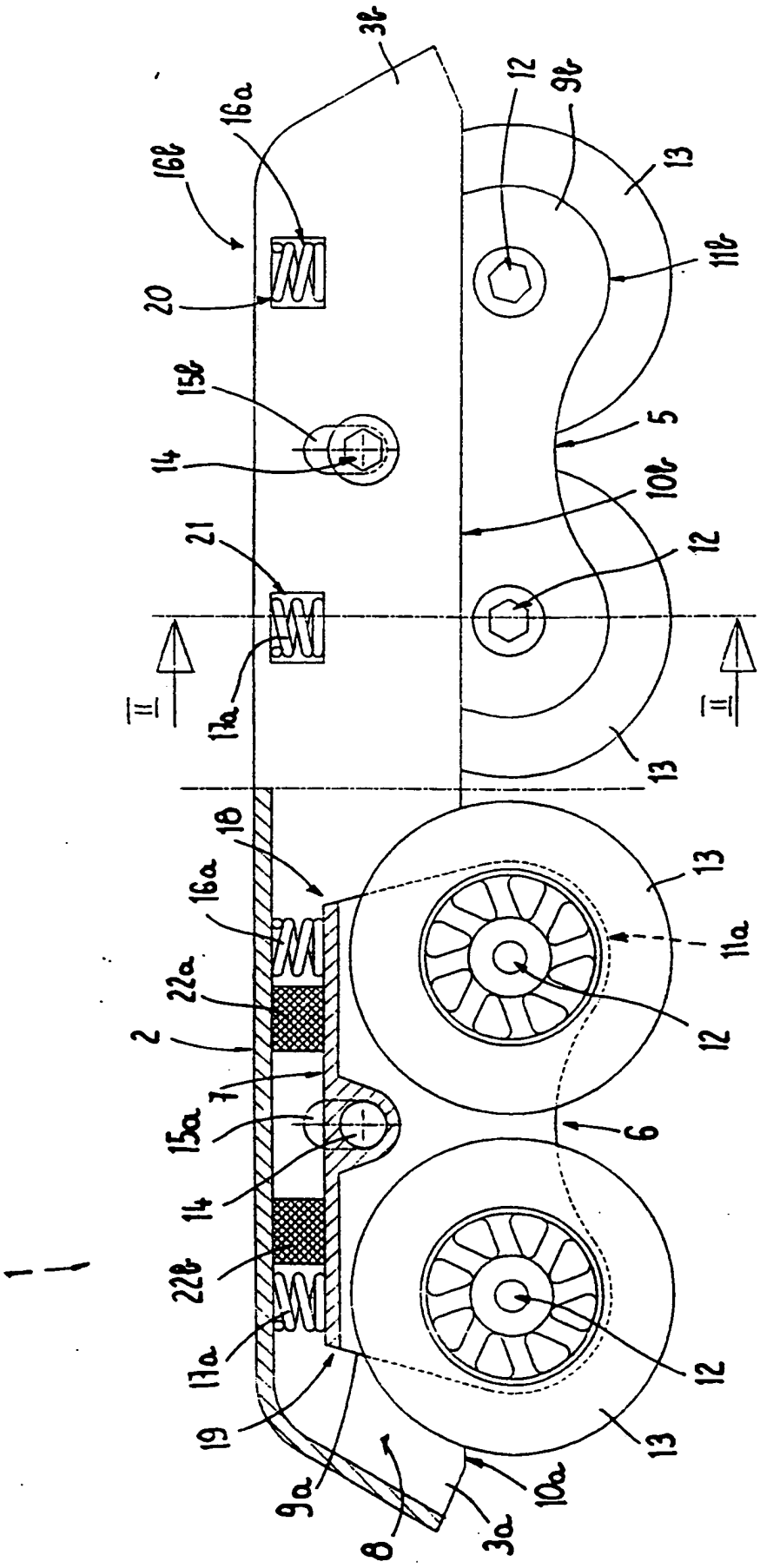
protruding below said first base towards the ground along an axis parallel to the plane of arrangement of each individual truck, said pair of tabs being arranged transversely to said first lateral wings, the front and rear ends of each truck interacting with said pair of tabs.

19. A skate according to one or more of the preceding claims, characterized in that a flap protrudes outwards, above the pivoting axis of said first pivots, from both second lateral wings, said flaps being arranged approximately parallel to said overlying lower perimetric edge of said first wings.

20. A skate according to claim 19, characterized in that second seats for first flexible elements are formed at the lower perimetric edge of said first wings which are adjacent to said flaps, proximate to said front and rear ends of said first and second trucks, said flexible means being constituted by first pairs of springs and by a second pair of springs.

21. A skate according to claim 20, characterized in that it is possible to interpose, in the interspace between said second and first bases, at least one second flexible element constituted by a third pair of springs or pads which are removable and have, in longitudinal cross-section, substantially an isosceles trapezoid shape, said shape allowing to vary the rotation axis of one or more wheels in an upward direction or in a downward direction.

22. A skate according to claim 21, characterized in that said third pair of springs or pads can be accommodated at the interspace provided between said first and second bases by providing at least one opening at one of said second lateral wings.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8
9a
9r
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10r
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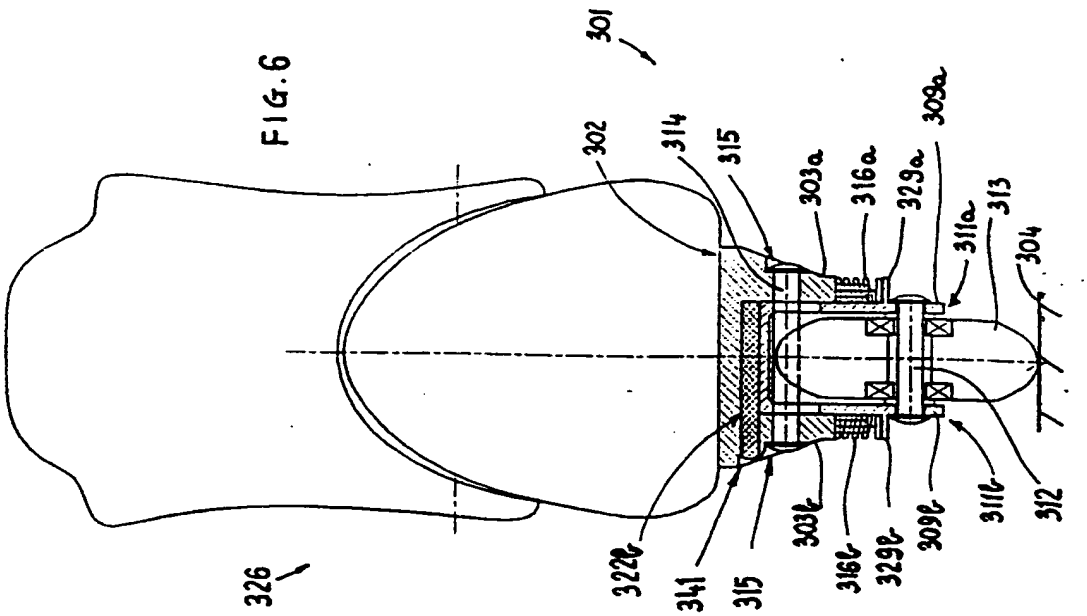
11r
12
13
14
15a
15r
16a
16r
17a
18
19
20
21
22a
22r
3a
II
II

FIG,1

FIG.6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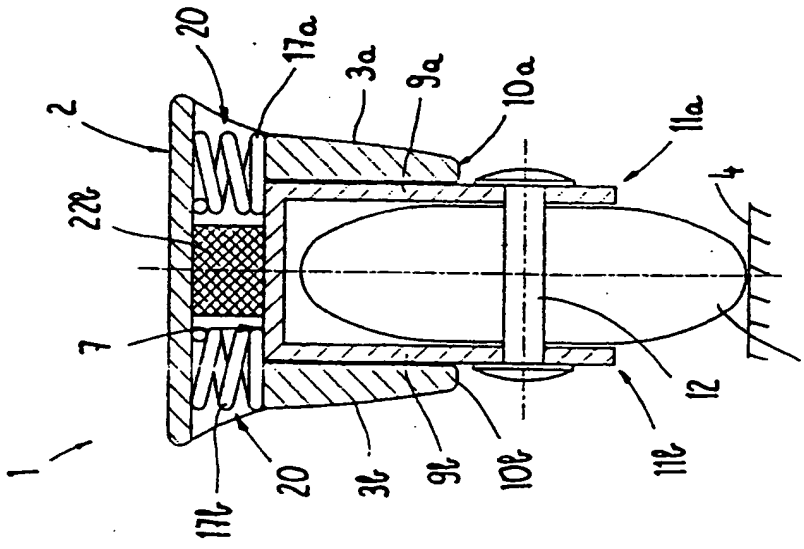
315
341
322b
326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2
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7
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9a
10a
11a
4
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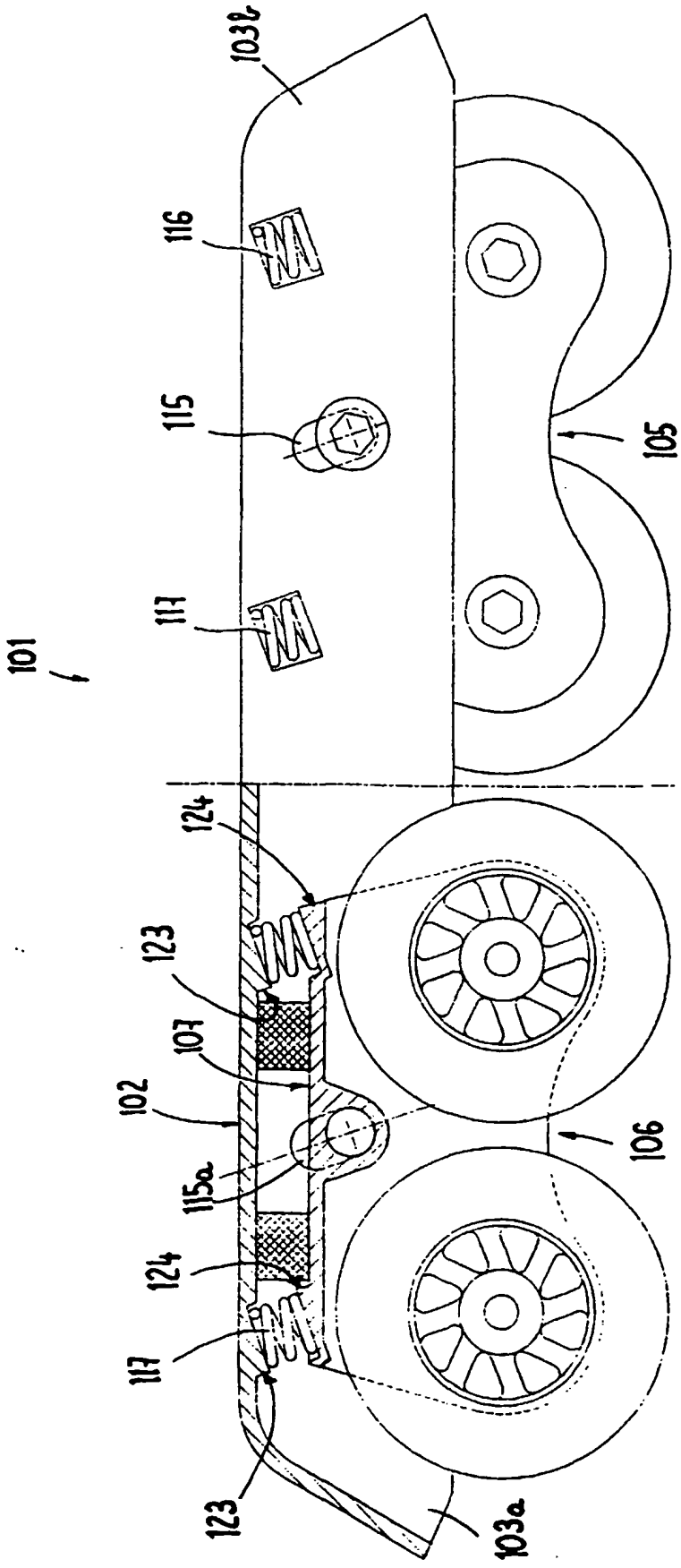
9b
10b

FIG.2


103b
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107
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115a
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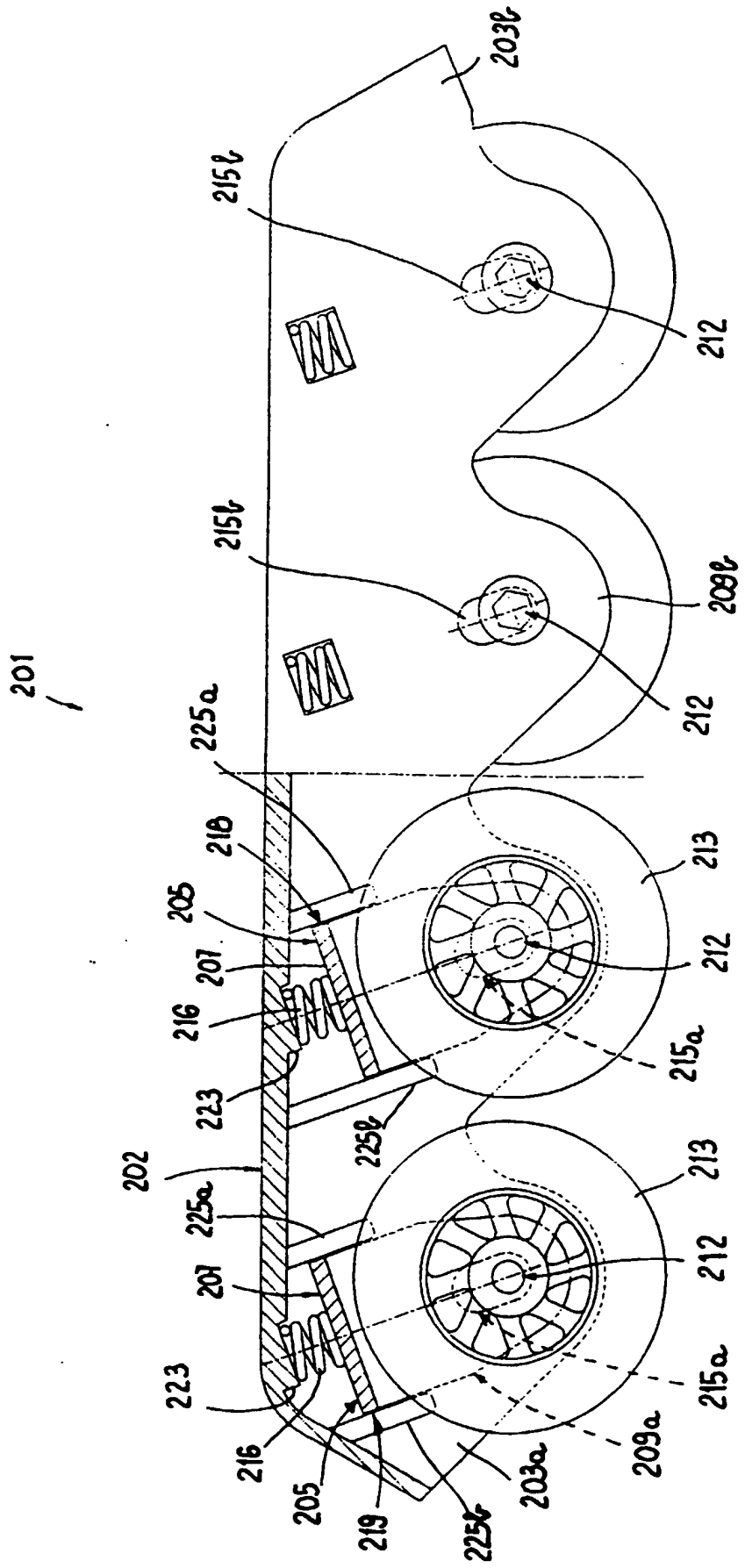
117
123
103a

FIG. 3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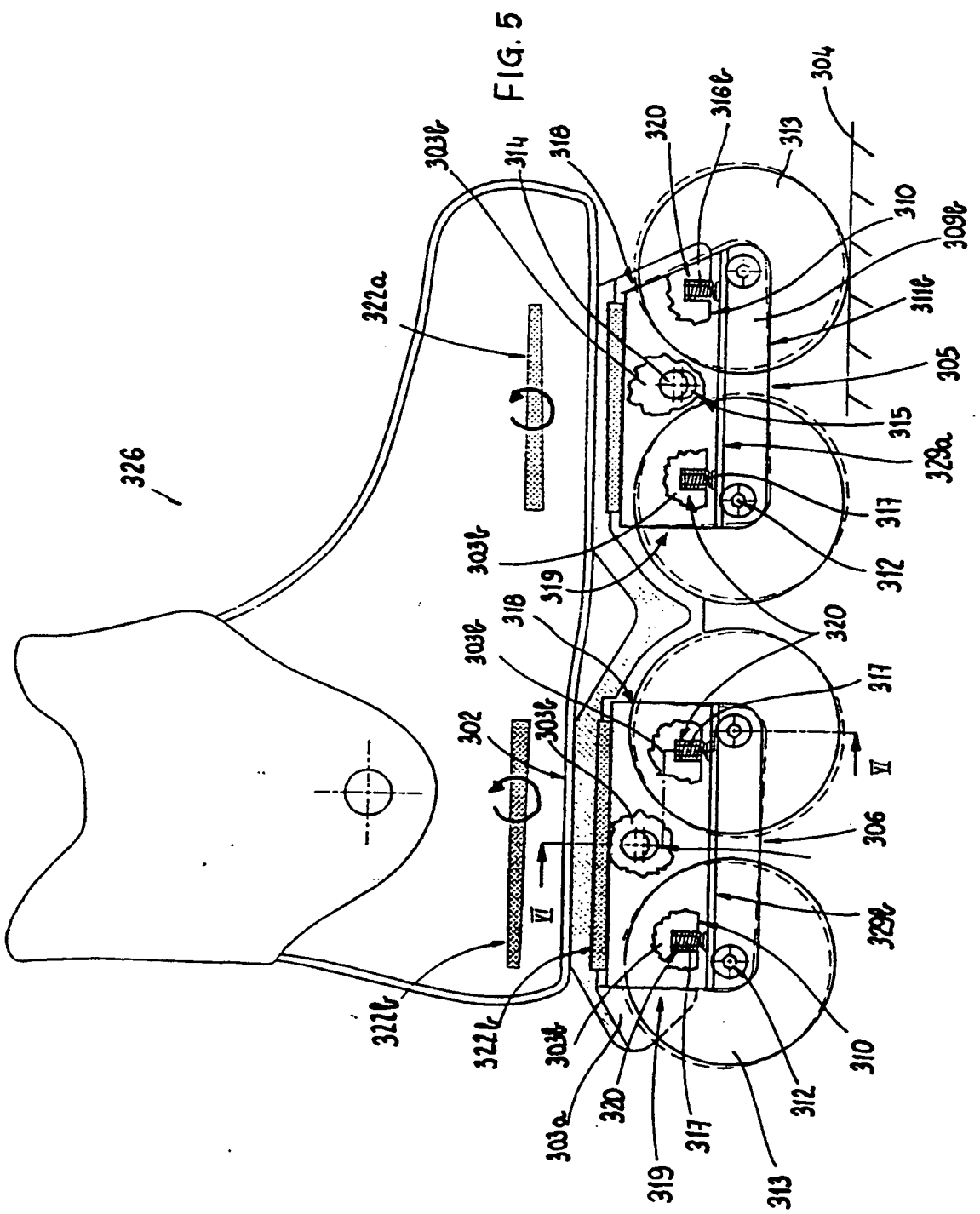
212
215a

FIG.4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318
320
303b
311
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303b
VI
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329b
VI
310
322b
322b
303a
320
319
317
312
313

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 97 12 0360

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X A	DE 296 13 117 U (HSIEH ET AL) * page 3, paragraph 2; figures 1,2 *	1,2 3-10	A63C17/06
X A	DE 42 09 415 A (NEUSTEIN) * figures 1-4 *	1,2 3-5	
A	GB 2 300 572 A (TING-HSING CHEN) * figure 1 *	1-5,11, 21	
P,A	WO 97 02072 A (OLIEMANS ET AL) * page 15, paragraph 4 - page 16, paragraph 1; figures 1,3 *	1,2	
P,A	DE 196 40 525 A (GORGES) * figure 1 *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A63C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 March 1998	Steegman, R

CATEGORY OF CITED DOCUMENTS

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